WINDING DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

Priority is claimed from U.S. Provisional Patent Application No 60/511,822 filed October 15, 2003. The entire disclosure of this provisional application is considered to be part of the disclosure herein and is incorporated by reference.

FIELD OF THE INVENTION

This invention generally relates to a winding device and more particularly to an apparatus and method to rewind the line of marker buoys, pre-strung blanks, kit string reels, and the like.

BACKGROUND OF THE INVENTION

A marker buoy is a floating device to mark a specific location on a body of water. Typically, a marker buoy includes a length of up to about 150 or more feet of line wrapped around the center and terminating with a lead weight. Marker buoys come in various sizes and shapes, and typically are barbell-like shaped, i.e., with opposing bulbous shaped ends to provide flotation connected with a connecting shaft for the line to wrap around. In existing marker buoys, the two prominent shapes of the ends are either rounded or square. After a marker buoy is used, the line may be rewound around its center for a repeated use or for storage until a future use.

Fishermen who utilize boats, with and without electronics, throw a marker buoy into the water to identify the underwater location of fish and/or structure. The lead weight sinks to the bottom of the body of water, or to another structure, such as a submerged tree, rock or other solid material. The sinking lead weight unwinds the attached line wrapped around the connecting shaft of the marker buoy, thereby spinning the marker buoy on or near the surface of the water. The length of line also may be marked to indicate the depth of the water. This allows the fisherman to return to the identified location of a given marker buoy and be confident that he is fishing at the desired specific location. Without the use of one or more marker buoys, the fisherman would not know if he is still in the desired location, due to a variety of factors, such as wind drift or actually catching a fish and losing his position in the middle of the lake.

Existing marker buoys for the fisherman application are available from Lindy Little Joe and Berkley.

Similarly, underwater search and rescue units and other divers use marker buoys to identify specific locations on a body of water, e.g., to map or grid areas of underwater search. These types of marker buoys also can be carried during the dive and be deployed directly by the diver under water. At the specific location desired to be identified, the diver then can release a marker buoy. The marker buoy will float to the surface, unwinding line as it ascends, instead of floating on the surface and unwinding line as the weight descends. Once the marker buoy reaches the surface of the water, it is held in location by the weight attached to the line at the other end. Relative to the fisherman marker buoy, existing marker buoys for this application generally are smaller and more compact, with stronger, larger line attached to the weight. Also, these marker buoys typically have one end that is flat and one end that includes an eye to secure the marker buoy to the diver. Existing marker buoys for the search and rescue application are available from Pelican.

A major drawback to using marker buoys is the time and aggravation required to rewind the line back around the buoy once the user decides to change locations. The normal procedure is to retrieve the buoy and wind the line by hand around the buoy. Not only is this time consuming, it often is a considerable aggravation, particularly with cold water or inclement weather.

One attempt to address these problems for the fisherman application required the modification of the marker buoy to accept battery powered cordless drills and screwdrivers to assist in the rewinding of the line. In addition to requiring a specially designed marker buoy, and thereby not working for existing marker buoys, this required tools that are not necessarily designed for open water environment and thereby susceptible to water damage. See U.S. Patent No. 5,376,035 to Forrest.

Another attempt to provide a mechanical rewinding of marker buoys for the fisherman application required a specially designed marker buoy with particularly sized, shaped and positioned detents on each end. The winder had a housing with a drive shaft protruding into the housing from one end and a support shaft protruding into the housing from the other end. In this device, the protruding drive shaft was particularly sized,

shaped and positioned to connect with a corresponding detent in one end of the marker buoy. Similarly, the protruding support shaft was particularly shaped, sized and positioned to be inserted into the corresponding detent in the other end of the marker buoy. Again, this winder would not work with any existing marker buoys, let alone a variety of marker buoys, but rather required a specially designed marker buoy. Also, the detents in the specially designed marker buoy would be susceptible to clogging from mud, gravel, small rocks and other debris, which would require the user to inspect the detents before rewinding and clean them, if necessary. As a result of their protrusion into the housing, the drive shaft and support shaft would be susceptible to breaking, bending or other damage to the two shafts themselves, as well as to other objects and users. Further, this winder was not adaptable to a variety of shapes, sizes and configurations of existing marker buoys, among other shortcomings. See U.S. Patent No. 5,449,308 to Thompson.

Yet another prior winding device utilized a specially sized and shaped receiver to hold one end of a correspondingly sized and shaped marker buoy. However, the receiver generally was not adapted to rewind different types or styles of marker buoys. To rewind a marker buoy having a different size, shape and/or configuration, the receiver of that device was removable so that it could be replaced with a different receiver that was specially sized and shaped for that different marker buoy. That device also did not support the other end of the marker buoy during rewinding or transport. See U.S. Patent No. 5,195,688 to Clemmons.

As such, a need exists for an improved winding device to rewind the line of a variety of shapes, sizes and configurations of marker buoys, blanks and other devices desired to be rewound.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts a side cut-away view of one embodiment of the invention, with a typical marker buoy placed therein.

Figure 2 depicts the winder of Figure 1, with an exploded side view of a portion of a first end of the winder.

Figure 3 depicts an end view of a second end of the winder depicted in Figure 1.

Figure 4 depicts a side view of the winder of Figure 1, with a typical marker buoy placed therein.

Figure 5 depicts a perspective view of an adaptor to electrically connect a winding device of the present invention to an external power source.

Figure 6 depicts a side view of the winder of Figure 1 having a cover.

Figure 7 depicts a perspective view of a mount for use with the winder depicted in Figure 1.

Figure 8 depicts an end view of a winder mounted on a mount depicted in Figure 7.

Figure 9 depicts a side cut-away view of another embodiment of the present invention, with an alternative marker buoy placed therein.

Figure 10 depicts a side view of an alternative market buoy for use with the winder of Figure 9.

Figure 11 depicts an exploded side view of a portion of a first end of the winder depicted in Figure 9.

Figure 12 depicts an end view of a turning receiver of the winder depicted in Figure 9.

DETAILED DESCRIPTION

This invention generally relates to a winding device and more particularly to an apparatus and method to rewind the line of marker buoys, pre-strung blanks, kite string reels, and the like. In one embodiment of the invention, a winding device is designed to rewind the line of a variety of existing sizes, shapes and configurations of marker buoys. The device preferably is adapted to accept marker buoys of various dimensions, e.g., marker buoys of different lengths, heights and/or widths, of different shapes, e.g., rounded or squared, with or without paddles, fins or other protrusions, and with or without indents or other recesses. The winding device preferably is designed to be portable, compact, waterproof, weather resistant, and sufficiently durable for outside use. The winding device may be powered by a variety of power sources and combinations of power sources, such as replaceable batteries, rechargeable batteries, a temporary electrical connection to an outside source of power, such as a cigarette lighter outlet, and/or a more permanent direct electrical connection to an outside power source, such as wiring through the fuse box to a battery on a boat.

A preferred embodiment of the present invention is a device designed to provide a powered rewinding of the weighted line of typical marker buoys available to the public, e.g., through Lindy Little Joe, Berkley and Pelican.

In one embodiment of the invention, a device and method to rewind the weighted line of a marker buoy is disclosed. Preferably, the device and method are adapted to accommodate a wide variety of sizes, shapes and designs of marker buoys, including current and past marker buoys available to the public, and more preferably without requiring modification to the marker buoys or the purchase or use of specially designed marker buoys or additional tools.

Referring now to Figures 1 and 4, a device of the present invention is shown, with a typical marker buoy 12. In this embodiment, the winder 10 generally comprises a housing 20, a drive mechanism 30 and a power source 40.

The housing 20 preferably is adapted to receive and house one marker buoy 12. The housing 20 comprises a first end 22 and a second end 24, connected to each other by a bottom 26, and preferably at least one side panel 28 extending upwards at least a portion of the height of the first end 22 and the second end 24, a drive housing 34 and a

power source housing 36. One or more of these components of the housing 20 may be constructed as a separate piece, combined into one or more composite pieces or combined into a single piece constituting the entire housing 20. Also, if one or more of these components of the housing 20 are separate pieces or composite pieces, they may be readily detachable and attachable. Preferably, the components of the housing 20 are not readily removable, but rather the housing 20 is constructed of component pieces to form a water proof housing to secure the drive mechanism, power source, related electronics and controls and other structure, as described herein.

The housing 20 may be constructed of a variety of materials, but preferably is constructed of a material that is relatively impervious to water, durable, resistant to ultraviolet radiation damage and readily and inexpensively available and manufactured. A preferred embodiment utilizes ABS plastic in the construction of the housing 20 and rubber O-rings to seal connecting points and lines between components to the housing 20. Although individual components of the housing 20 may be constructed of different materials, preferably, first end 22, second end 24, bottom 26, sides 28, drive housing 34, and power source housing 36 are constructed of the same material, with that material preferably being ABS plastic. Preferably at least a portion of the housing 20 also comprises a non-skid surface to reduce the amount of slippage, particularly since the winder is designed to be operated in a wet environment. Also, the housing 20 preferably is designed to be buoyant, and more preferably to be able to float, for a predetermined amount of time.

In the embodiment shown in Figures 1-4, the first end 22 of the housing 20 is adapted to receive one end of a convex shaped object, such as an end of a typical marker buoy, to assist in holding the marker buoy in the housing during the winding operation and at other times when desired, and to allow the rotation of the marker buoy about the longitudinal axis of the housing 20. Preferably, first end 22 is concave shaped to accept a variety of sizes and shapes of the generally convex shaped marker buoys by contacting the outside surface of one end of the marker buoy. The concave shaped structure allows the housing 20 to wind marker buoys 12 of a variety of designs, including those with a smooth face and those with openings or detents or protrusions, such as fins or paddles. Preferably, the first end 22 is constructed of a material, such as ABS plastic or nylon, that

provides relatively low friction for the rotation of the marker buoy about the first end 22 and within the housing.

Preferably, a winder of the present invention is adapted to accommodate marker buoys of various shapes, sizes and compositions and to align and adjust the movement of such marker buoys toward the receiver. In a preferred embodiment, the distance between the first end and the second end of the housing is adjustable to accommodate marker buoys having a range of lengths. Referring to Figure 2, first end 22 is adapted to accommodate marker buoys of different lengths, through the use of a threaded male endpiece 23 and a matching threaded female end 25. Male endpiece 23 is threaded into female end 25 until the desired distance between first end 22 and second end 24 is obtained. To accommodate the different lengths of typical marker buoys currently available, preferably, the threads of endpiece 23 and end 25 are approximately one inch to approximately two inches in length and constructed of approximately one inch double thread.

The length of the threading on the two endpiece 23 and end 25 will determine the extent of the adjustability of the winder for marker buoys of different lengths. For example, to accommodate marker buoys of shorter length, male endpiece 23 may be lengthened and its threaded portion lengthened, which allows the male endpiece 23 to extend further into the interior of the housing 20. This shortens the distance between the first end 22 and the second end 24 and thereby will hold a shorter marker buoy in place for rewinding.

To more securely maintain the position of male endpiece 23 at the desired position and thereby more securely hold marker buoy 12, is it preferred to employ a locking mechanism. In a preferred embodiment, the housing 20 comprises a rotatable notched end that allows entry of the male endpiece 23 into female end 25 and is closed after endpiece 23 has been threaded into the desired position.

Also, as shown in Figure 1, first end 22 also preferably comprises a handle 27. In the embodiment of Figure 2, handle 27 is shown attached to male endpiece 23. Handle 27 advantageously facilitates the insertion of male endpiece 23 into the housing 20 and the longitudinal adjustment of the housing 20 for marker buoys of different lengths.

Handle 27 also provides additional ergonomic advantages and a convenient point of contact to grab the winder 10, e.g., in the event of it falling overboard.

The second end 24 of the housing 20 is adapted to receive the other end of a typical marker buoy. Second end 24 is adapted to assist in holding the marker buoy in the housing during the winding operation and at other times when desired, and to provide a structure that will rotate the marker buoy along the longitudinal axis of the housing 20 by a power source. The rotation may be clockwise or counter-clockwise, or preferably the rotation may be selectively clockwise or counter-clockwise.

As shown in Figure 1, second end 24 of the housing 20 comprises a turning receiver 32, adapted to contact the outer surface of one end of the marker buoy 12 and to rotate the marker buoy 12 about the longitudinal axis of the marker buoy 12. The size and shape of the turning receiver 32 is adapted to contact a sufficient amount of the end of the marker buoy 12 to hold the marker buoy 12 at the desired location and, with power from the drive 30, rotate the marker buoy 12 about its longitudinal axis. Preferably, the turning receiver 32 also is concave shaped to facilitate the use of the winder 10 with marker buoys of a variety of sizes, shapes and configurations. More preferably, turning receiver 32 is circular in cross-section and is adapted to contact as much of the outer surface of the end of the marker buoy as possible. Preferably, the diameter of the turning receiver 32 is approximately 1 inch to approximately 6 inches, and more preferably approximately 2 inches to approximately 4 inches and even more preferably is approximately 3 inches in diameter. A turning receiver of the present invention is thereby able to hold and rotate marker buoys having a variety of sizes, shapes and configurations, including those with fins, paddles or other protrusions, all without the need to modify the marker buoys.

Preferably, the turning receiver 32 is constructed of a material that frictionally engages the marker buoy 12, sufficiently to hold the marker buoy in the desired position and, with power from the drive 30, to rotate the marker buoy 12 along the longitudinal axis of the marker buoy 12. In general, the greater the elasticity of the material, the greater the coefficient of friction and the greater the ability of the turning receiver to contact and rotate the marker buoy. More preferably, the turning receiver 32 is constructed of a material, such as neoprene rubber, that grippingly engages the marker

buoy 12 and advantageously maintains its ability to engage and rotate the marker buoy even when wet.

The winder 10 also comprises a drive 30 and a power source, which are designed to provide the necessary power to rotate the turning receiver 32, and thereby rotate the marker buoy 12. The drive 30 preferably is constructed of an electrical drive motor incorporating a plantary gear mechanism to deliver the desired torque and speed to rotate marker buoys of conventional size. For a typical fisherman marker buoy application, preferably the electrical drive motor provides approximately 0.5 Newton-meters. Preferably, winder 10 is adapted to be capable of winding approximately 50 to approximately 200 feet of line per minute, more preferably approximately 75 to approximately 100 feet of line per minute, and even more preferably approximately 85 feet of line per minute. Alternatively, a winder of the present invention may comprise a manual drive, such as a hand crank or other device to rotate the turning receiver.

The power source may be external or internal. In the embodiment shown in Figures 1 and 3, an internal power source 40 is provided as batteries housed in power source housing 36 and electrically connected to drive 30. Preferably, the batteries are rechargeable, such as nickel cadmium or nickel metal hydride, and the housing 20 is adapted to allow one to recharge the batteries through a sealable opening and without the necessity of removing the batteries. In a typical fisherman application, it is preferred to employ 10 AA size rechargeable batteries, heat shrunk together. Alternatively, the batteries may be non-rechargeable. However, in that case, the housing 20 must be designed to allow the removal and replacement of expired batteries, while maintaining the desired characteristics of the housing, e.g., waterproof, weather resistant, durable, etc.

More preferably, winder 10 is adapted to be powered by more than one power source. As shown in Figure 1, winder 10 comprises sealable socket 42 to provide an electrical connection between the drive 30 and an external power source. Preferably, socket 42 is sealable, such as by a rubber plug, when not in use. The external power source may be any of a variety of sources, preferably portable and convenient for use in a boat or other transport and capable of use outside, such as the battery of the boat. In the embodiment shown in Figure 5, adaptor 50 comprises jack plug 52, cord 54 and lighter plug 56. Jack plug 52 is adapted to sealably, electrically connect with socket 42 of

winder 10 and lighter plug 56 is adapted to electrically connect with a standard cigarette lighter commonly available in boats, automobiles and other vehicles. Cord 54 completes the electrical connection between the external power source and the drive 30 and preferably is approximately 6 to approximately 15 feet in length, and more preferably approximately 12 feet in length. Preferably, jack plug 52 is adapted to provide a seal with socket 42 to maintain the waterproof and weather resistant characteristics of the housing 20. Socket 42 is adapted to maintain the waterproof and weather resistant characteristics of the housing 20 when jack plug 52 is not connected to socket 42, e.g., by self-sealing or preferably by inserting rubber plugs. Alternatively, drive 30 may be more permanently connected to a power source on the boat, such as by wiring through the fuse panel to the battery.

The winder 10 further comprises mechanisms to control its operation. Preferably, winder 10 comprises one or more external controls to allow an operator to selectively initiate operation, select the direction of rotation, determine the speed of the rotation, and stop operation. Such controls may include any type of control mechanisms available that have the capability of controlling the operation of the winder, such as switches, push buttons, dials, and the like, as well as remote electronic controls and other remote controls. In the embodiment shown in Figure 1, winder 10 comprises switches 46, 48 to start and stop the rotation of the turning receiver 32, as well as control the direction and speed of rotation of the turning receiver 32. More specifically, direct pressure on switch 46 initiates the rotation of the turning receiver 32 in one direction. Releasing the downward pressure stops the rotation of the turning receiver 32. Preferably, switch 48 operates in the same manner, but in the opposite direction of rotation. Since a marker buoy 12 may be partially rewound when placed into the winder 10, the ability to selectively rotate the marker buoy 12 in either direction advantageously allows the user to simply place the marker buoy 12 into the winder 10 without regard to the direction of the desired rotation for rewinding. Also, the controls may be further adapted to provide for variable speed, i.e., increasing the downward pressure increases the speed of the rotation, while decreasing the downward pressure decreases the speed of the rotation.

As shown in Figures 1 and 3, drive 30 is preferably housed within drive housing 34, which may be a part of housing 20. Drive housing 34 is preferably constructed of the

same material as the rest of housing 20 and is water tight to protect the drive 30 from the elements.

Referring now to Figures 1 and 4, housing 20 preferably further comprises at least one side panel 28 extending from first end 22 to second end 24, and more preferably comprises one side panel on each side of housing 20. Side panel 28 extends vertically from the bottom 26 to a height sufficient to form a housing for a typical marker buoy 12 to assist in securing the marker buoy 12 during operation and storage. In a preferred embodiment shown in Figures 1 and 4, the top edge of side panel 28 is approximately at the top of housing 20 at first end 22, decreases in vertical dimension along at least a portion of the longitudinal axis of housing 20, reaches a minimum height before or approximately at halfway towards second end 24, and increases in vertical dimension to reach approximately the top of housing 20 at second end 24. Preferably, the minimum height of side panel 28 extends vertically approximately halfway or more the height of a typical marker buoy placed in housing 20.

More preferably, side panel 28 further comprises guide 44 to assist in guiding the line to be wound around the middle of marker buoy 12. Preferably, guide 44 comprises a groove or notch approximately 1 to approximately 4 inches in length, and more preferably approximately 1.5 inches to approximately 3 inches in length, and approximately 0.25 to approximately 1 inches in height, and more preferably approximately .375 inches to approximately .5 inches in height. Even more preferably, the groove or notch of guide 44 is approximately 1.5 inches in length for a winder for a fisherman application and approximately 3 inches in length for a winder for a search and rescue application.

Winder 10 also may comprise a mechanism to cover all or part of the housing, which may provide additional safety during operation. Such a cover may be particularly advantageous for winding marker buoys having fins, paddles or other protrusions. As shown in the embodiment of Figure 6, housing 20 further comprises cover 49 that extends across the top of the housing 20 and preferably over at least a portion of side panel 28. Cover 49 may be a separate piece from the housing 20, and preferably is movably attachable to the housing 20, such as by a hinge. Even more preferably, cover 49 is rotatably movable about the longitudinal axis of the housing 20, such that cover 49

rotates into housing 20 when not engaged and rotates out and across the top of the housing 20 when engaged.

In one embodiment, a device of the present invention is adapted to accept pre-strung blanks, which are dumbbell shaped structures containing a predetermined length of string wrapped around the blank. A winder of the present invention is adapted to contact and rotate blanks, and thereby rewind the blanks, without any indentations, extensions, or other modifications to the blanks. This application may be useful in rewinding string used as guides in road or other construction projects.

Referring now to Figure 9, another embodiment of the invention is disclosed, with a marker buoy 112 of the type typically used by search and rescue personnel. In addition to being deployed from the surface, the marker buoy 112 for this application also is adapted to be carried by the diver and released while underwater to identify a particular location. As shown in Figure 10, the marker buoy 112 typically is shaped differently from a marker buoy used by fisherman, such as marker buoy 12 of Figure 1, particularly at the ends. For example, a rescue marker buoy 112 typically includes a series of four regularly spaced gussets converging at the very end of the marker buoy 112. The space between adjoining gussets typically is not filled with material, but rather is open space. During operation as a marker buoy on the surface of the water, these gussets, and the spaces between them, operate to reduce the amount of spinning after the weight has reached the bottom. Also, rescue marker buoys often are constructed of softer, less durable materials than fisherman marker buoys and typically use a heavier line, which may require the use of a larger motor than that required for a fisherman marker buoy.

Winder 100 of Figure 9 operates similarly to the winder 10 of Figure 1, but comprises adaptations for the different configurations, compositions, and/or uses of marker buoys used by search and rescue personnel. As would be apparent to those in the art, winders of the present invention also may be adapted for other types of marker buoys, or other devices that have line, string or other flexible material desired to be rewound.

In general, winder 100 of Figure 9 comprises a housing 120, a drive mechanism 130 and a power source (not shown). The points of contact between the winder 100 and the marker buoy 112 are adapted to better fit the size, shape and configuration of typical search and rescue marker buoys and to provide greater protection for marker buoys of

less durable construction. As shown in Figures 9-11, winder 100 comprises male endpiece 123 having handle 127 and is adapted to be threaded into housing 120. In a preferred embodiment shown in the exploded view of Figure 11, male endpiece 123 further comprises rotating member 121, which is adapted to be rotatably connected to male endpiece 123 and to provide a contact surface with one end of a marker buoy 112 placed into housing 120. Rotating member 121 may be rotatably connected to male endpiece 123 by a variety of mechanisms, such as snap fit plastic pieces. Preferably, male endpiece 123 and rotating member 121 have a circular interface between each other and optionally may employ a series of ball bearings to facilitate such rotation. In operation, rotating member 121 is designed to rotate with marker buoy 112 about the longitudinal axis of housing 120 and male endpiece 123. Because this contact point rotates with the marker buoy 112, there is less stress and pressure on the marker buoy during operation.

In this embodiment, winder 100 further comprises turning receiver 132 , adapted to contact the outer surface of one end of the marker buoy 112 and to rotate the marker buoy 112 about the longitudinal axis of the marker buoy 112. The size and shape of the turning receiver 132 is adapted to contact a sufficient amount of the end of the marker buoy 112 to hold the marker buoy 112 at the desired location and to rotate the marker buoy 112 about its longitudinal axis. Preferably, turning receiver 132 comprises at least one arm extending outwardly to contact a sufficient amount of at least a portion of the outer surface of one end of the marker buoy 112, so as to be able to rotate the marker buoy 112.

In the embodiment shown in Figures 9 and 12, turning receiver 132 comprises a plurality of arms or lugs 133a-d extending outwardly to provide contact points with one end of marker buoy 112. Preferably, lugs 133a-d frictionally hold the end of marker buoy 112 and protect the marker buoy 112 during insertion and rewinding. Lugs 113a-d preferably are adapted to contact the surface of one or more of the gussets of the marker buoy 112. With a typical marker buoy 112 having four gussets converging at the end of the marker buoy, turning receiver 132 preferably comprises four corresponding lugs, shown as 133a-d in Figures 9 and 12. Each of lugs 133a-d preferably are adapted to fit in the space between adjoining gussets, and to contact the surface of the gussets and thereby

rotate the marker buoy 112. More preferably, lugs 133a-d are sized and shaped to substantially fill the space between adjoining gussets of marker buoy 112, while maintaining the ability to insert and remove the marker buoy 112 from the winder 100. Preferably the lugs 113a-d are rounded to facilitate insertion and removal of a marker buoy 112 into the winder 100.

The lugs 133a-d may be constructed of the same or a different material as the rest of the turning receiver 132, and additionally may be coated or covered at least in part with a material that provides additional capabilities to hold the marker buoy 112, such as a rubber coating to grippingly hold the marker buoy 112. For a typical rescue marker buoy 112 having a substantial surface area of Styrofoam or similar material on the end that is in contact with turning receiver 132, the turning receiver 132 and the lugs 133a-d preferably are constructed of ABS plastic.

Typical rescue marker buoys, such as marker buoy 112, have an eyelet on each end, which are generally not sufficiently sturdy to utilize in the winding operation. To protect such eyelets and to facilitate the overall operation of the winder, winder 10 preferably comprises structure to protect the eyelets from the stresses of the winding operation. Turning receiver 132 preferably comprises a recess or slot adapted to receive an eyelet of a typical rescue marker buoy, more preferably without engaging the eyelet to affect rotation of the marker buoy. Similarly, the other end of the winder, such as rotating member 121 and/or male endpiece 123, comprises a recess or slot adapted to receive an eyelet on the other end of the marker buoy, more preferably without engaging the eyelet during operation.

Upon rewinding the line, a rescue marker buoy typically is stored with the weight held in place at one end with a cotter pin through one of the eyelets. By partially unthreading the male endpiece 123 to provide additional room in the housing, the weight may be secured by the cotter pin and optionally contained within the winder for storage.

Winders of the present invention may be operated in an operator's hand or otherwise held in position by the operator, or may be temporarily or more permanently mounted on another structure, such as a portion of the boat or other vehicle. In a preferred embodiment of the invention shown in Figures 7 and 8, mount 60 is adapted to be securely mounted at a desired location on the boat and adapted to releasably secure a

winder. In this embodiment, mount 60 comprises groove 62 adapted to receive at least a portion of winder 10, and more preferably substantially all of the length and height of power housing 36. At one end of mount 60, groove 62 terminates with a stop 68, which is adapted to prevent further movement beyond that position and prevent winder 10 from sliding partially or completely through mount 60. At the other end of mount 60, a tab 66 may be employed to allow the insertion of winder 10, but prevent the unintentional release of winder 10 from mount 60 in that direction. Mount 60 further may comprises one or more gussets 64 to provide additional strength and durability. As shown in Figures 7 and 8, winder 10 may be selectively, releasably secured in mount 60 by sliding power source housing 36 of winder 10 into groove 62. Utilizing such a mount, winder 10 may be mounted for use in a variety of dimensions, including horizontally, vertically or some other angle.

The size and design of winders of the present invention allow the user to conveniently take the winder to a variety of locations, including when traveling by air or transportation other than his boat, and to use the winder under a variety of conditions. The winder also may be utilized to conveniently and securely house and transport a marker buoy, with little additional space than the marker buoy itself. When mounted or otherwise positioned in a boat, the winder is compact, may be releasably or more permanently mounted in a selected location and may house an unused marker buoy, further reducing clutter in the boat. With space on a fishing boat at a premium, a winder of the present invention is designed to occupy little more than the space required by a typical marker buoy.

A preferred method of operating a winder of the present invention will now be described. In general, a marker buoy, blank or similar object is inserted into the winder for rewinding. One end of the object is placed against a turning receiver, which is adapted to contact a sufficient amount of the outer surface of the object to hold the object in the desired location and, with power from a power source applied to the turning receiver, to rotate the object for rewinding. At the other end of the object, an endpiece is positioned to contact a sufficient amount of the outer surface of that end of the object and to hold the object at the desired location. The user activates the winder through a control, the power source rotates the turning receiver, which in turn rotates the marker buoy. In

one embodiment, the marker buoy rotates about the endpiece. In another embodiment, a portion of the endpiece rotates with the marker buoy. Upon rewinding, the winder is deactivated, the endpiece is removed from contact with the marker buoy and the marker buoy is removed from the winder. Alternatively, the marker buoy may be stored within the winder after use.

In a preferred embodiment, the winding apparatus has a first end, also referred to herein as the plunger, that is concave shaped to support and align dumbbell shaped marker buoys of various sizes to the electrically driven concave shaped turning receiver. The second end includes an electrically driven concave shaped turning receiver that holds the other end of the marker buoy and allows for the power rotation of the marker buoy along the longitudinal axis of the winding apparatus in either a clockwise or counter clockwise direction. The plunger preferably is a solid piece that may be threaded to facilitate alignment of the marker buoy in the winding apparatus and to adjust the effective length of the winding apparatus to accommodate marker buoys of various lengths. The turning receiver preferably utilizes an electrical motor with planetary gear mechanism modeled for necessary speed and torque to turn the marker buoys at desired speeds. Preferably, the winding apparatus is designed to be water tight and buoyant.

Access to the winder is accomplished by opening the cover, if present, by rotating the mechanism back upon itself and at least partially into the housing of the winder. This action moves the safety mechanism out of the way to allow placement of the marker buoy or pre-strung blank into the winding device. Once the marker buoy or pre-strung blank has been inserted into the winding device, the safety mechanism is returned to its original position.

The plunger, is then rotated to align the marker buoy with the turning receiver and provide positive contact to the receiver. The plunger moves the device to be wound towards the turning receiver and accomplishes positive contact with the turning receiver to facilitate winding action.

After the positive contact with the turning receiver has been made, the user can determine whether he wants to have the winder move in a clockwise or counter clockwise direction, such as by activating a switch. Once the line is at the desired length, the winder may be deactivated by removing pressure on switch.

The embodiments described above have been directed to a winder having the capacity to house and rewind one marker buoy. An alternative embodiment of the invention is adapted to have the capacity to house a plurality of marker buoys, with the capacity to rewind one marker buoy at a time. Yet another embodiment of the invention may house a plurality of marker buoys, with the capacity to rewind the same or a different number of marker buoys at a time. In one alternative embodiment, a series of winders, like those described above, may be arranged in an end-to-end line formation.

The foregoing discussion of the invention has been presented for purposes of illustration and description. The foregoing is not intended to limit the invention to the form or forms disclosed herein. In the foregoing Detailed Description for example, various features of the invention are grouped together in one or more embodiments for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed invention requires more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the following claims are hereby incorporated into this Detailed Description, with each claim standing on its own as a separate preferred embodiment of the invention.

Moreover though the description of the invention has included description of one or more embodiments and certain variations and modifications, other variations and modifications are within the scope of the invention, e.g. as may be within the skill and knowledge of those in the art, after understanding the present disclosure. It is intended to obtain rights which include alternative embodiments to the extent permitted, including alternate, interchangeable and/or equivalent structures, functions, ranges or steps to those claimed, whether or not such alternate, interchangeable and/or equivalent structures, functions, ranges or steps are disclosed herein, and without intending to publicly dedicate any patentable subject matter.